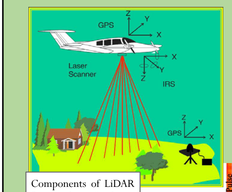
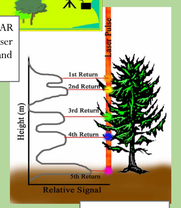
# 2006 LIDAR PROJECT PILOT - ELEVATION POINT DATA TO 3D SURFACE

**LiDAR Project 2006**
- Joint project between City of San José, County, and SCVWD
- Returns high-quality locational data
- Awarded to Optimal Geomatics

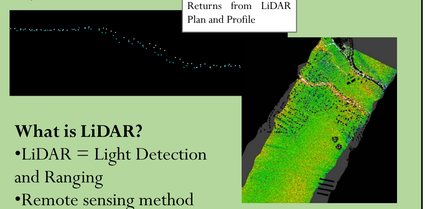



Components of LiDAR Survey Aircraft, Laser Scanner, GPS, and Inertial System




Order of Returns

Point "Cloud" Data Returns from LiDAR Plan and Profile



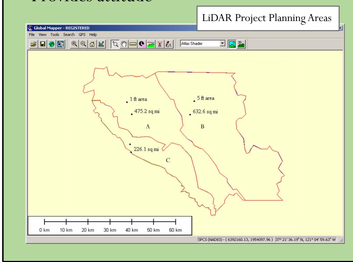
**What is LiDAR?**
- LiDAR = Light Detection and Ranging
- Remote sensing method
- Laser emits and receives thousands of laser pulses per second to determine the distance to ground
- Return pulse indicates amount of reflectivity of the surface
- The order that returns are received helps designate materials
- Provides geo-referenced imagery that aids in

Cessna 208B Grand Caravan

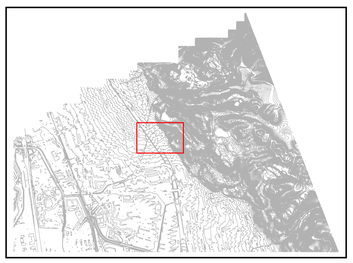
LiDAR - OPTECH ALTM3100

**LiDAR System Components**
- Aircraft - Fixed-wing, helicopter
- Laser Scanner - High repetition laser
- GPS System - Provides positioning
- Inertial Measurement Unit - Provides attitude

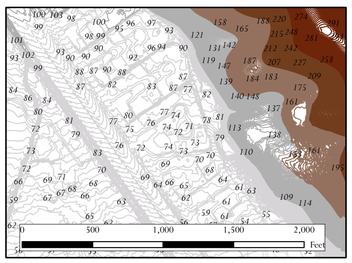
LiDAR Project Planning Areas



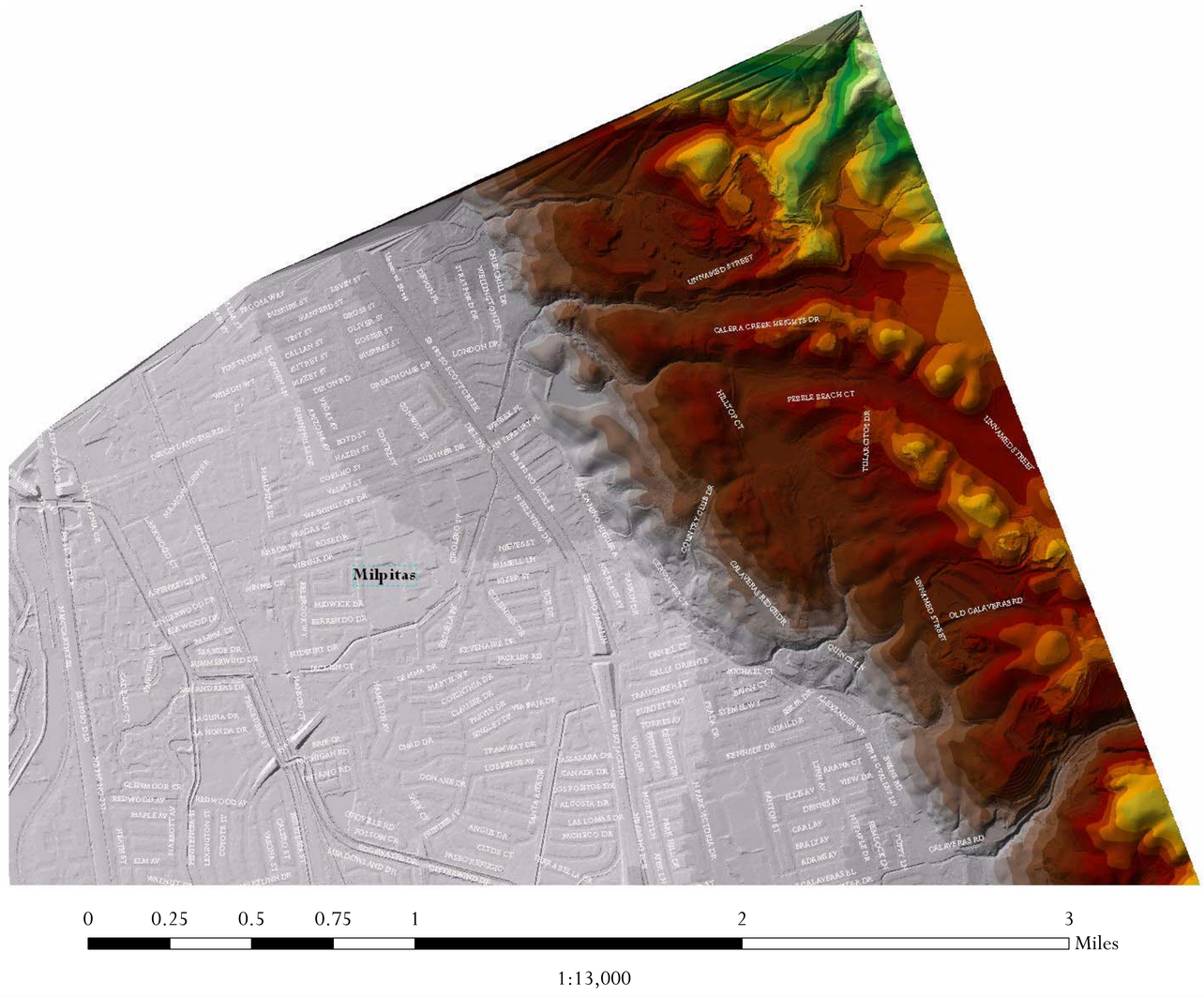

**Data collected**
- Divided into 3 areas A, B, and C
- 36 hours of collection
- 12 flights
- 06April – 01May2006
- ~150 flightlines collected
- ~12 billion points
- Bare Earth Model derived by using last returns and "subtracting" buildings, vegetation, etc
- Upcoming datasets: building footprints, top of bank



5 foot contours for the Area A pilot. Contours and other GIS data such as street centerlines, parcels, and zoning information can be "draped" over 3D surfaces.




A close up view of the 1 foot contours. Note that roads, curbs, building pads, and other features are easily identified. Contours can provide information for storm runoff modeling and water pressure zones.




**Area A TIN**

**Elevation (feet)**

- 1250 - 1300
- 1200 - 1250
- 1150 - 1200
- 1100 - 1150
- 1050 - 1100
- 1000 - 1050
- 950 - 1000
- 900 - 950
- 850 - 900
- 800 - 850
- 750 - 800
- 700 - 750
- 650 - 700
- 600 - 650
- 550 - 600
- 500 - 550
- 450 - 500
- 400 - 450
- 350 - 400
- 300 - 350
- 250 - 300
- 200 - 250
- 150 - 200
- 100 - 150
- 50 - 100
- 5 - 50

Above is a 3D surface of the Milpitas area produced by creating a TIN (triangular irregular network) from the 1 foot contours for Area A Pilot. TINs model continuous surfaces by mathematically constructing a series of non-overlapping triangles between data points. The surface can represent elevation difference as is shown here. Each color represents 50 feet of elevation. There are a multitude of uses for this data. For example, profiles can be generated to show detail that can be useful when detecting slope change in drainage channels to identify fault traces. The surface can also be symbolized to show aspect - the compass direction slopes face. This is useful in determining how much sunlight a slope receives. Hillsides, represented through surfaces, can be analyzed to determine which is most vulnerable to landslides based on the degree of slope and material. Surfaces can also be used to do line of sight analysis to determine the viewshed from a particular point. This is useful when siting cell phone towers and other structures. In addition, surfaces can be used for watershed analysis, floodplain mapping and environmental restoration. Finally, surfaces can be used interactively - using special software, the viewer can "fly-through" canyons and over hills.

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY
10th Largest U.S. City

City of San José - Department of Public Works

Director: Katy Allen

Created by GIS Section August 28, 2006
Milpitas street names courtesy of Alan Rich, GIS Manager, of the City of Milpitas
LiDAR images and data provided by Optimal Geomatics
Surface generated using ArcGIS and 3D Analyst Extension - Poster created using ArcGIS

optimal geomatics
Map the present. Manage the future.
ESRI